

mechanical instrument, subservient to the function of digestion; we next proceed to consider the structure and composition of those cavities of the skull which gave lodgment and protection to the organs of *special* sense, and endeavour to deduce from their structure conclusions as to the degree in which the organs were developed, and the circumstances under which the senses were exercised.

The orbit of *Toxodon* forms the anterior boundary of the zygomatic area; it is about as distinctly defined as in the Tapir or Dugong, having its osseous rim less complete than in the Hippopotamus, yet more developed than in the Capybara, Coypus, and many other Rodentia, in which the orbit is scarcely distinguishable in the cranium from the small space occupied by the origin of the temporal muscle.

The lower boundary of the orbit in *Toxodon* is formed by an excavation in the upper and anterior part of the zygoma; the upper boundary by a strong and rugged overarching process of the frontal bone, the posterior angle of which (*a*, Pl. III.) descends a little way, but leaves a space of three inches and a half between it and the opposite angle of the malar bone below (*b*, Pl. II. and III.), the circumference of the orbit being completed probably by ligament in the recent subject. The cavity thus circumscribed is remarkable for the preponderance of the vertical over the transverse or longitudinal diameter, and indicates great extent of motion of the eyeball in the vertical direction, such as may be supposed to be well adapted to the exigencies of an amphibious quadruped. The orbit of the Capybara, or Water-hog, makes a near approach to the form just described. In the elevation of the supra-orbital boundary, and its outward projection in the *Toxodon*, we perceive an approximation to the form of the orbit in the Hippopotamus, but the size of the orbit is relatively larger in the *Toxodon*, which in this respect manifests its affinity to the Rodentia.

In that part of the bony structure of the auditory apparatus, which is visible on the exterior of the cranium, the skull of the *Toxodon* presents a character in which it recedes from the Rodentia. In these, the tympanic portion of the temporal bone is remarkably developed, forming a large bulla ossea between the glenoid cavity and the occiput; and it always remains disunited to the other elements of the temporal bone. In the *Toxodon* the tympanic bone (*c*, Pl. II.) consists of a rough compressed vertical osseous plate, wedged in transversely between the occiput and the posterior part of the glenoid cavity. The internal extremity of this plate points inwards and forwards, representing the styloid process; behind this is seen the petrous bone, which forms a small angular protuberance at the basis cranii, and is less developed than in the Hippopotamus. Anterior to the petrous bone are the orifices of the Eustachian tube, and carotid canal; external to it is the great foramen lacerum, for the jugular vein and nervus vagus; and behind it is the anterior condyloid foramen. The foramen auditorium externum is only half an

inch in diameter, and gives passage to a long and somewhat tortuous meatus, which passes inwards and slightly forwards and downwards; its direction being precisely the same as in the Hippopotamus; it was accompanied, probably, by as small an external auricle.

But the indications of the aquatic habits of the *Toxodon*, which are presented by the osseous parts relating to the senses of sight and hearing, are of minor import compared with those afforded by the bony boundary of the nostrils. This boundary circumscribes a large ovate aperture, the aspect of whose plane is upwards, and a little forwards, as in the Herbivorous Cetaceans, and especially the Manatee (*Trichechus Manatus*, Cuv.) In one part of the bony structure of the nasal cavity the *Toxodon* deviates, however, in a marked degree from the Cetaceous structure; I allude to the frontal sinuses, which are exposed by the fracture of the upper part of the skull. (They are shewn in Plate III., and an asterisk is placed on one of the narrow canals of intercommunication between the sinuses and the nasal passages.) The posterior orifice of the nasal cavity is relatively larger and wider than in the Herbivorous Cetaceans, and differs both in form and aspect in consequence of the greater extent of the bony palate. The *Toxodon* further differs from the Manatee and Dugong, in the firm nature of the connexion of the bones of the head; and it differs from the Hippopotamus in the strong attachment of the intermaxillary bones to the maxillaries.

There next remain to be described, as far as the shattered condition of the skull will permit, the relative position, extent, and connexions of the principal bones composing it.

The *occipital bone* exhibits a complete confluence of its basilar, condyloid, and supra-occipital elements. The basilar portion, in connexion with the corresponding element of the sphenoid bone, describes a curve whose convexity is downwards. The condyles are large, extended in the transverse direction, completely terminal, and a little inclined downwards below the level of the basilar process. The curve of the articulating surface describes, in the vertical direction, two-thirds of a circle, indicating that the head must have possessed considerable extent of motion upwards and downwards upon the atlas; thus, while the body of the *Toxodon* was submerged, the head probably could be raised so as to form an angle with the neck, and bring the snout to the surface of the water without the necessity of any corresponding inflection of the spine. Indeed, in the form and position of the condyles, the *Toxodon* more nearly resembles the true Cetacea than any other existing mammalia; and it is only with these that it can be compared in regard to the aspect of the plane of the occipital foramen, and of the occipital region of the skull. This is inclined forwards from the occipital foramen at such an angle, that on viewing the skull from above, not only the